A **linear equation** in variables $x_1, x_2, ..., x_n$ is an equation of the form $a_1 x_1 + a_2 x_2 + ... + a_n x_n = b$, where b and the coefficients $a_1, a_2, ..., a_n$ are real or complex numbers, usually known in advance. The subscript n can be any positive integer.

A **system of linear equations** (**linear system**) is a collection of one or more linear equations involving the same variables.

A **solution** of the system is a list of numbers $s_1, s_2, ..., s_n$ that makes each equation a true statement when substituted for $x_1, x_2, ..., x_n$, respectively. The set of all possible solutions is the **solution set** of the system. Two linear systems are **equivalent** if they have the same solution set.

A system of linear equations is said to be **inconsistent** if it has no solution. It is **consistent** if it has either one solution or infinitely many solutions.

Consider the linear system

$$x_1 - 2x_2 + x_3 = 0$$
$$2x_2 - 8x_3 = 8$$
$$-4x_1 + 5x_2 + 9x_3 = -9$$

The matrix

$$\begin{bmatrix} 1 & -2 & 1 \\ 0 & 2 & -8 \\ -4 & 5 & 9 \end{bmatrix}$$

is called the **coefficient matrix** of the system. The matrix

$$\begin{bmatrix} 1 & -2 & 1 & 0 \\ 0 & 2 & -8 & 8 \\ -4 & 5 & 9 & -9 \end{bmatrix}$$

is called the **augmented matrix** of the system. The **size** of a matrix indicates the number of rows and columns a matrix has. An $m \times n$ matrix is a rectangular array of numbers with m rows and n columns.